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ASSESSMENT OF MOTOR SKILL PROFICIENCY IN 10–12-YEAR-OLD ROMANIAN KEMPO PRACTITIONERS

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Abstract: *This research aimed to identify the level of motor skill proficiency in 10–12 - year-old Kempo practitioners at the national level, operationalized by investigating explosive strength and execution speed, which are essential components of Kempo performance. The subjects of this observational study were 100 Kempo practitioners aged 10-12 years. Participants were recruited from various Kempo clubs across Romania, ensuring national representation of young athletes involved in this martial art. To achieve the research objective, a battery of tests and trials specifically selected to assess motor skills relevant to Kempo performance was utilized. These assessed agility, balance, coordination, explosive power, and speed. The results showed that, while the young Kempo practitioners demonstrated adequate levels of agility, balance, and coordination, their explosive strength and execution speed were deficient. The model of specific physical training for Kempo practitioners at this age needs to be adjusted by rethinking the specific training means designed to improve these fundamental skills. Further research aims to explore the effectiveness of various training strategies to optimize these skills and ultimately enhance the performance of young Kempo practitioners.*

Keywords: *Kempo, motor skills, youth athletes, explosive strength, execution speed.*

1. Introduction

Athlete performance depends on the quality of the training process, and to achieve superior performance in elite sports, the use of advanced training and recovery techniques is imperative [13].

The research followed a descriptive approach, aiming to identify and quantify the level of physical fitness of 100 athletes, both girls and boys, practicing Kempo. This study aimed to explore in detail the particularities of the physical training of Kempo athletes and sought to obtain a clear picture of the current level of physical condition and its potential for improvement.

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The analysis of empirical data highlighted the structure of the components of physical training (strength, speed, endurance, agility, coordination), determining the specific level of training achieved by athletes at the time of the study.

Standardized tests used to assess physical performance included strength, speed and agility, endurance, and coordination tests. The data obtained were statistically analyzed to describe and interpret the results.

2. Materials and Methods

Through our research, we investigated the level of development of fundamental physical skills in junior athletes (age category 10-12 years) practicing the discipline of Kempo at the national level.

The main objective of the study was to establish a comprehensive profile of the physical condition of these athletes, with an emphasis on identifying strengths and weaknesses, to optimize the specific training process:

- analysis of the level of specific physical training, identifying positive and negative aspects.
- identification of aspects that can be improved in the physical training of this age group;
- the analysis of the development level of physical fitness components (strength, speed, endurance, agility, coordination) in 10-12 years old Kempo athletes, with the aim of determining their current physical condition status at this age category at the national level;
- evaluation of the effectiveness of current training methods used in the preparation of junior Kempo fighters.

Evaluation tests of the research Table 1

Evaluation tests		Duration	Instruments used	Grading system
1.	Push-ups	30''	Stopwatch	M: S (10), G (15), VG (20), E (25) F: S (8), G (12), VG (14), E (20)
2.	Burpees	30''	Stopwatch	M: S (10), B (12), VG (14), E (16) F: S (8), B (10), VG (12), E (14)
3.	Squats	30''	Stopwatch	M: S (15), B (20), VG (23), E (25) F: S (14), B (18), VG (20), E (22)
4.	Plank	maximum 2'	Stopwatch	M: S (30"), B (60"), VG (90"), E (120") F: S (25"), G (50"), VG (80"), E (120")
5.	Fast kicks	30''	Stopwatch/ punching bag	M: S (15), G (20), VG (23), E (25) F: S (14), G (18), VG (20), E (22)
6.	Standing long jump	3 attempts	Measuring tape	M: S (125cm), G (150cm), VG (175cm), E (200cm) F: S (120cm), G (135cm), VG (155cm), E (170cm)
7.	Matorin Test	3 attempts	Measuring tape, mat, chalk	M: S (150º – 180º) ; G (180º - 230º); VG (230º – 280º); E (over 280º). F: S (120º - 150º); G (150º – 200º); VG (200º – 260º); E (over 260º).
8.	Shark Skill Test	2 attempts	Measuring tape, mat, chalk	M: S (16"), G (14"), VG (12"), E (10") F: S (18"), G (16"), VG (14"), E (12")

Legend*:* S = satisfactory; B = good; VB = very good; E = excellent

The activities carried out included the selection of evaluation tests and trials, their application, the collection and analysis of results, and the formulation of conclusions.

The aim of the study was to identify the level of specific physical training of athletes practicing Kempo in Romania, in the 10 - 12-year-old junior category. Additionally, an evaluation of the effectiveness of current training methods used in the preparation of junior Kempo fighters was desired.

To ensure the relevance of the evaluation tests to the specific nature of Kempo, a thorough analysis of martial arts literature was conducted, both nationally [8] and internationally, complemented by studying the selection tests used by the national team of the Romanian Kempo Federation.

The level of specific physical training was evaluated through six tests (push-ups, Korean push-ups, squats, plank, repeated leg kicks [20], standing long jump), as well as two tests described in the specialized literature (the Matorin test [15] for coordination and the Shark Skill test [12] for agility and balance).

Each test was conducted within a precise time frame, established in accordance with clearly defined training objectives [17], to allow for consistent monitoring of progress and to identify individual variations.

3. Research Organization

The study was conducted over a period of seven months (September 2023 - March 2024) in various Kempo clubs across Romania. Over 100 junior athletes (10-12 years old), both girls and boys, were included in the study.

Eligibility criteria included:

- aged between 10 and 12 years old, with at least one year of training experience.
- registration with the Romanian Kempo Federation.
- participation in at least one event from the competitive calendar.
- informed consent (all participants were required to agree voluntarily and participate knowledgeably in the study, with parental consent).

The data collected during the research provided detailed information about the performance of the studied group, reflecting their current stage of training.

Research organization Table 2

No.	Activities performed	Beginning date		Finalization date
1	Studying evaluation tests and trials in the context of the purpose	04.09.2023	17.09.2023	13
2	Test and trial selection and application	18.09.2023	08.01.2024	112
3	Test implementation and scheduling	08.01.2024	29.01.2024	21
4	Data collection of results	05.02.2024	26.02.2024	21
5	Analysis of the obtained results	04.03.2024	20.04.2024	47
6	Synthesis and interpretation of results	22.04.2024	06.05.2024	14
7	Drawing conclusions	06.05.2024	12.05.2024	6

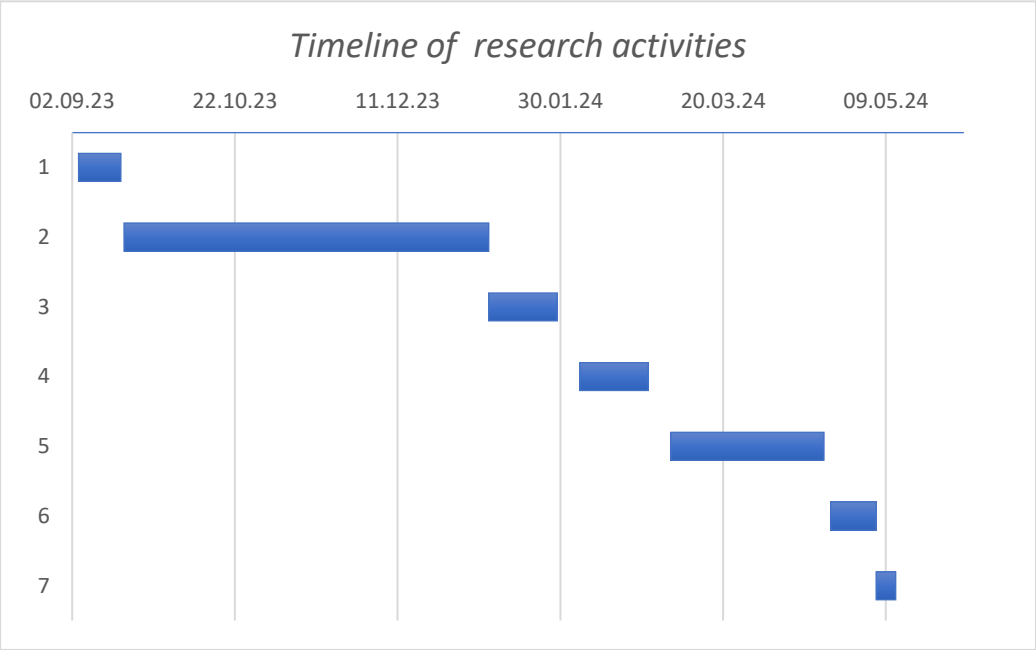

Fig. 1. *Gantt Diagram [19] - timeline of preliminary research activities*

4. Result

Data obtained from the tests were accurately recorded, carefully stored, and processed using EXCEL 2021 on a WINDOWS 10 Pro platform. Subsequently, the data was systematized and statistically analyzed using appropriate methods to determine average values, standard deviations, and other relevant indicators. The selected statistical indicators were the arithmetic mean [9], median, maximum and minimum values, standard deviation [2], [5], and coefficient of variability [1].

The study's results highlighted a series of relevant aspects regarding the physical fitness level of the participating athletes. The evaluation protocol was developed through a synthesis of the author's accumulated practical experience in martial arts and systematic observations made in the context of training sessions. The following table presents the evaluation tests, standards, and ratings for each individual test, based on which the quantitative and qualitative analysis of the results was conducted.

5. Analysis of Results

The descriptive study of physical fitness test results reveals a heterogeneous distribution of performance across various motor skills.

The satisfactory to good levels recorded in strength and speed tests, highlighted by push-ups and squats, contrast with the superior performances observed in agility and endurance tests. This discrepancy suggests a need to optimize training strategies, with a particular focus on developing muscle strength, to maximize the efficiency of Kempo-specific movements.

In the context of Kempo, muscle strength plays a decisive role in generating

the power of strikes [6]. Therefore, a relative deficiency in this motor skill can significantly limit an athlete's potential in competitions.

The suboptimal results obtained in the push-up and squat tests indicate a pressing need to intensify specific training for the development of upper and lower limb strength.

The detailed analysis of the physical fitness test results highlights the importance of a balanced training regimen that gives equal attention to all components of physical fitness.

Optimizing muscle strength, especially in the upper and lower limbs, is a priority for Kempo practitioners, as it has a direct impact on the efficiency of strikes and, consequently, on competitive performance.

The following tables present the statistical indicators determined based on the results recorded by the study subjects in the evaluation tests, upon which the quantitative and qualitative analysis of the results was conducted.

Table 3

Statistical indicators of performance in physical fitness evaluation tests for male and female

S.I.	Control Trials M+F						Tests	
	P.U.	BU	SQ	PL	FK	L J	MT	SST
1. A.M.	13,10	11,55	19,37	83,97	19,22	153,71	220,50	14,26
2. MED	13,00	12,00	19,50	87,50	19,00	155,00	220,00	13,92
3. MIN	1,00	7,00	7,00	5,00	10,00	100,00	20,00	10,23
4. MAX	21,00	16,00	27,00	120,00	33,00	190,00	320,00	42,11
5. S D	3,75	2,34	3,26	24,97	3,57	18,84	35,88	3,54
6. C V	28,61	20,23	16,82	29,73	18,60	12,25	16,27	24,81

Legend: *S.I. = Statistical Indicators; M = Male; A.M. = Arithmetic Mean; MED = Statistical Median; MIN = Minimum; MAX = Maximum; SD = Standard Deviation; CV = Coefficient of Variation; P.U. = Push-ups; BU = Burpees; SQ = Squats; PL = Plank; FK = Fast Kicks; L J = Long Jump; MT = Matorin Test; SST = Shark Skill Test*

The analysis of the descriptive statistical indicators in the table highlighted aspects of scientific relevance concerning the physical fitness evaluation of the subjects, particularly focusing on the parameters of muscle strength, execution speed, and motor coordination, which are fundamental in sports performance.

Muscle strength, evaluated through the standardized “Push-ups”, “Burpees [4],” and "Squats" tests, demonstrated notable heterogeneity among the participants. The arithmetic means of "Push-ups" (13.10 repetitions) and “Squats” (19.37 repetitions) indicates an average level of strength development in the sample.

However, the high coefficient of variation (C.V.) of 28.61% for “Push-ups” and 20.23% for “Burpees" indicates a significant data dispersion. This observation suggests the existence of marked individual differences in force generation capacity, potentially attributable to factors such as training level, predominant muscle fiber type [3], or execution technique.

Execution speed [10], [14], quantified by the "Fast Kick" test, showed a relatively homogeneous distribution, with an arithmetic mean of 19.22 repetitions and a C.V. of 18.60%. This uniformity of performance may indicate a homogeneity of the sample regarding execution speed or effective standardization of the test.

Motor coordination, analyzed through the "Matorin Test" [15] and the "Shark Skill Test [11], [12]", revealed considerable variability among subjects. In the "Matorin Test, the arithmetic mean of the rotation angle (220.50 degrees) and the CV of 16.27% denote a notable dispersion, while the average time of 14.26 seconds, with a C.V. of 24.81%, highlights significant individual differences in complex motor coordination. These variations can be attributed to factors such as previous motor experience, neuromotor control level, or the ability to adapt quickly and efficiently to new motor tasks [7].

6. Discussions

The analysis of data collected from physical performance evaluation tests revealed a series of aspects that indicate the need for specific and individualized physical training to maximize the potential of Kempo practitioners. These findings underscore the importance of adequate physical preparation to maximize performance capacity [16] in Kempo. Integrating other specific elements borrowed from other sports into Kempo training can contribute to improving strength, speed, agility, and movement control, leading to more efficient executions and better competitive results [18].

7. Conclusions

C1. The presented data highlight an average level of development in muscle strength and execution speed in the sample studied, with notable individual differences.

C2. Motor coordination is distinguished by significant inter-individual variability, suggesting the need for a differentiated approach in training this motor quality.

C3. The heterogeneity of the data, reflected by the C.V. values, necessitates specific sustained training programs that consider each subject's individual profile.

C4. In addition to the aspects mentioned above, the analysis identified a moderate level of general physical fitness and muscle endurance, with potential for improvement through specific sustained training.

Therefore, careful analysis of these statistical indicators reveals a significant variability in the subjects' physical aptitudes, emphasizing the need for individualized training programs to optimize athletic performance.

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